PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-080500
(43)Date of publication of application : 28.03.1997

(51)Int.Cl. G03B 5/00

(21)Application number : 07-229947
(22)Date of filing : 07.09.1995

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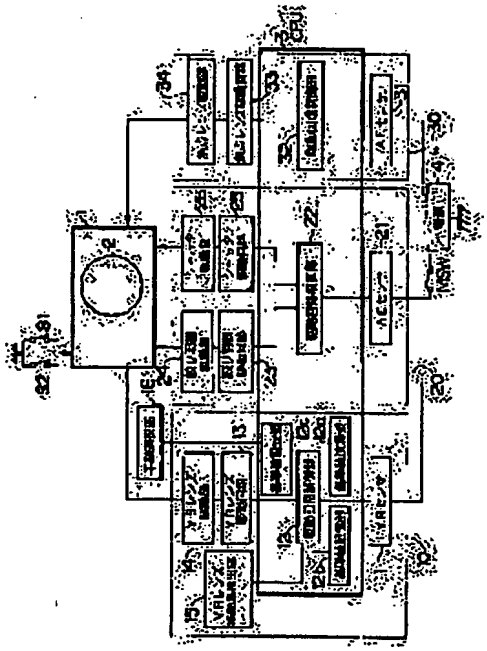
(54) BLUR CORRECTING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To save a power consumption and to suppress the burdens on a CPU by selecting either of a calculated blur reference value, or a stored blur reference value in accordance with the remaining amount of a power source and the processing capacity of the CPU.
SOLUTION: In the blur correcting device 10, the relative value of the blur reference value is regarded as the blur correcting amount, and the optical axis of the blur correcting optical system is changed so as to correct the blur. The device is provided with a blur sensor 11 for detecting the blur and a reference value calculating part 12a for calculating the blur reference value, based on the output detected by the blur sensor 11. Besides, the device is provided with a reference value storing part 12b for storing the previously adjusted blur reference value of the blur sensor 11. Either of the reference value calculating part 12a and the reference value storing part 12b is selected by a reference value setting part 12c so as to set the blur reference value. The blur reference value is set, based on either of information on the remaining amount of the power source 4, information on the processing ability of the CPU, and manual input information.



LEGAL STATUS

[Date of request for examination] 06.09.2002
[Date of sending the examiner's decision of rejection] 27.01.2004
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] In the Bure compensator which the amount of Bure amendments is calculated, and the optical axis of the Bure amendment optical system is changed based on relative Bure who detected, and the Bure reference value, and amends Bure BURESENSA which detects relative Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by said BURESENSA, The Bure compensator characterized by having the reference-value storage section which makes the Bure reference value with which said BURESENSA was adjusted beforehand memorize, and the reference-value setting section which chooses either said reference-value operation part or said reference-value storage sections, and sets up said Bure reference value.
[Claim 2] It is the Bure compensator characterized by said reference-value setting section setting up said Bure reference value in the Bure compensator according to claim 1 based on the information about the residue of a power source.
[Claim 3] It is the Bure compensator characterized by said reference-value setting section setting up said Bure reference value in the Bure compensator according to claim 1 or 2 based on the information about the throughput of a central processing unit.
[Claim 4] It is the Bure compensator characterized by said reference-value setting section setting up said Bure reference value based on manual-input information in the Bure compensator given in any 1 term from claim 1 to claim 3.
[Claim 5] In the Bure compensator which the amount of Bure amendments is calculated, and the optical axis of the Bure amendment optical system is changed based on relative Bure who detected, and the Bure reference value, and amends Bure BURESENSA which detects relative Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by said BURESENSA, The reference-value storage section which makes the Bure reference value with which said BURESENSA was adjusted beforehand memorize, It is the Bure compensator characterized by having the reference-value setting section which sets up the result of an operation of said reference-value operation part as a Bure reference value when the difference of the result of an operation in said reference-value operation part and the Bure reference value memorized by said reference-value storage section is predetermined within the limits.
[Claim 6] In the Bure compensator which the amount of Bure amendments is calculated, and the optical axis of the Bure amendment optical system is changed based on relative Bure who detected, and the Bure reference value, and amends Bure With BURESENSA which detects relative Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by said BURESENSA, when predetermined time passes The Bure compensator characterized by having the reference-value setting section which is made to suspend the operation of said reference-value operation part, and sets up the result of an operation at the time of the halt concerned as a Bure reference value

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the Bure compensator which calculates the amount of Bure amendments from relative Bure's output which the Bure detection sensor detected especially about the Bure compensator which amends Bure resulting from vibration of optical equipments, such as a camera.
[0002]
[Description of the Prior Art] Conventionally, when this kind of Bure compensator carries out shift migration of the Bure correcting lens in the right-angled direction of a field to the optical axis of optical system based on the amount of Bure amendments, the method which performs Bure amendment (henceforth VR) is put in practical use.
[0003] The include angle of vibration from which VR sensor produces said amount of Bure amendments to optical equipments, such as a camera, angular velocity, angular acceleration, etc. are detected, and it asks by calculating this as a relative include angle, angular velocity, angular acceleration, etc. based on the include angle used as criteria, angular velocity, angular acceleration (henceforth the Bure reference value), etc. Therefore, in order to calculate the amount of Bure amendments, it is necessary to calculate the Bure reference value. In addition, VR sensor vibrates the oscillating section in a sensor with a predetermined frequency, and detects rotation produced by vibration of the body of the Bure compensator as Coriolis force.
[0004] And each of the output at the time of being in the condition in which the body of the Bure compensator stood it still, if this Bure reference value is calculated most simply, i.e., an include angle, angular velocity, angular acceleration, etc. is the outputs at the time of 0, and it can ask for this output by fixing optical equipments, such as a camera, with a tripod etc. However, it is not realistic to perform this for every photography.
[0005] Therefore, the conventional Bure compensator was calculating the Bure reference value by calculating full power after power is supplied to VR sensor at the time of photography with a camera until it starts exposure, and equalizing this.
[0006] Moreover, the Bure reference value can consider making the storage section which measured the output of a quiescent state for every VR sensor, and prepared this value in optical equipments, such as a camera, for example, at the time of factory shipments memorize.
[0007]
[Problem(s) to be Solved by the Invention] In calculating the Bure reference value, the conventional Bure compensator mentioned above had the following technical problems.
[0008] In order that VR sensor may vibrate the oscillating section in a sensor and may detect Bure as mentioned above, by the time it becomes fixed this vibrating it and its output is stable, it will require a certain amount of time amount. For this reason, even when any of the Bure reference value which the above-mentioned equalized, or the Bure reference value which the storage section was made to memorize are used before the output of a sensor was stabilized, Bure with a high precision cannot be amended but Bure may be increased on the contrary. Therefore, exposure initiation must be stood by and it is necessary to continue supplying power to VR sensor in the meantime until fixed time amount by which the output of a sensor is stabilized passes after power is supplied to VR sensor in order to perform Bure amendment with a more high precision.
[0009] However, since there is a limitation in the power source of optical equipments, such as a camera, and there is various constraint for every model of the further, it is difficult to continue supplying power to VR sensor as mentioned above.
[0010] Moreover, although the operation of said Bure reference value is performed by the central processing unit (henceforth CPU) with which optical equipments, such as a camera, were equipped, the throughput of this CPU also has constraint. That is, CPU is difficult to gather the rate of said operation which becomes complicated and to calculate the Bure reference value for a short time in order to also process the operation of AE or AF. Furthermore, if the manufacturing cost of optical equipments, such as a camera, and the magnitude of a body are taken into consideration, the throughput of CPU cannot be raised sharply, either.
[0011] Therefore, the conventional Bure compensator mentioned above had the problem of applying a burden to CPU while it had to work VR sensor over the long time, consequently consumed power remarkably, in order to perform Bure amendment with a more high precision. Moreover, the conventional Bure compensator mentioned above had the problem that Bure amendment based on a photography person's intention could not be performed, in order to equip optical equipments, such as a camera, with this, for example, to turn off a high-speed shutter when Bure amendment with a high precision did not need to be performed, or when you wanted to suppress consumption of power, and the burden to CPU.
[0012] The 1st technical problem of this invention is offering the Bure compensator which suppressed consumption of power, or the burden to CPU by performing a setup of the Bure reference value for calculating the amount of Bure amendments for a short time, maintaining a certain amount of precision. The 2nd technical problem of this invention is offering the Bure compensator which can choose the Bure reference value for calculating the amount of Bure amendments based on a photography person's volition, in order to suppress consumption of power, or the burden to CPU, corresponding to the situation of photography.
[0013]
[Means for Solving the Problem] In order to solve said technical problem, invention of claim 1 In the Bure compensator which the optical axis of the Bure amendment optical system is changed by making the relative value of the Bure reference value into the amount of Bure amendments, and amends Bure BURESENSA which detects Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by said BURESENSA, It is characterized by having the reference-value storage section which makes the Bure reference value with which said BURESENSA was adjusted beforehand memorize, and the reference-value setting section which chooses either said reference-value operation part or said reference-value storage sections, and sets up said Bure reference value.
[0014] Invention of claim 2 is characterized by said reference-value setting section setting up said Bure reference value based on the information about the residue of a power source in the Bure compensator according to claim 1.
[0015] Invention of claim 3 is characterized by said reference-value setting section setting up said Bure reference value based on the information about the throughput of a central processing unit in the Bure compensator according to claim 1.

[0016] Invention of claim 4 is characterized by said reference-value setting section setting up said Bure reference value based on manual-input information in the Bure compensator according to claim 1.
[0017] In the Bure compensator which invention of claim 5 makes the relative value of the Bure reference value the amount of Bure amendments, and the optical axis of the Bure amendment optical system is changed, and amends Bure BURESENSA which detects Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by this BURESENSA, The reference-value storage section which makes the Bure reference value with which said BURESENSA was adjusted beforehand memorize, When the difference of the result of an operation in said reference-value operation part and the Bure reference value memorized by said reference-value storage section is predetermined within the limits, it is characterized by having the reference-value setting section which sets up the result of an operation of said reference-value operation part as a Bure reference value.
[0018] In the Bure compensator which invention of claim 6 makes the relative value of the Bure reference value the amount of Bure amendments, and the optical axis of the Bure amendment optical system is changed, and amends Bure With BURESENSA which detects Bure, and the reference-value operation part which calculates the Bure reference value based on the output detected by this BURESENSA, when predetermined time passes The operation of said reference-value operation part is stopped, and it is characterized by having the reference-value setting section which sets up the result of an operation at the time of the halt concerned as a Bure reference value.
[0019]
[Embodiment of the Invention]
(1st operation gestalt) The gestalt of implementation of invention is explained in more detail hereafter, referring to a drawing etc. Drawing 1 is the block diagram showing the 1st operation gestalt of the Bure compensator by this invention. This operation gestalt shows the case where a camera is equipped with the Bure compensator by this invention. The camera of this operation gestalt is constituted by the body 1 of a camera, and the lens 2, and the half-push switch (S1) which makes photography preparations of shutter speed, accommodation of a focal distance, etc. by half-push of the main switch Msw which switches on a power source, and a release carbon button, and all the push switches (S2) that perform release actuation and start exposure by all push are formed in the body 1 of a camera.
[0020] Moreover, the body 1 of a camera is equipped with the Bure compensator 10, automatic exposure equipment 20, and automatic-focusing adjustment 30 grade. In the Bure compensator 10, the VR sensor 11 is a part which detects the posture (a location, a rate, acceleration, an include angle, angular velocity, angular acceleration) of the camera in a moment.
[0021] Moreover, the drive circuit control section 12 is equipped with reference-value operation part 12a, reference-value storage section 12b, and reference-value setting section 12c. Reference-value operation part 12a is a part which calculates the Bure reference value based on the output which said VR sensor 11 detected. The Bure reference value which reference-value storage section 12b is a part which makes the Bure reference value adjusted beforehand memorize, for example, was calculated from the output of the VR sensor 11 in a quiescent state is memorized. Reference-value setting section 12c is a part which chooses the Bure reference value used as the criteria for calculating the amount of Bure amendments, and in more than fixed, the residue of the power source 4 of the body 1 of a camera chooses the Bure reference value calculated by reference-value operation part 12a, and, in below fixed, it chooses the Bure reference value memorized by reference-value storage section 12b [invention of claim 2].
[0022] Moreover, reference-value setting section 12c chooses the Bure reference value memorized by the reference-value storage section 15, when choosing the Bure reference value detected by the detection sensor 11 when allowances were in the throughput of CPU3 and it is hard-pressed [invention of claim 3].
[0023] Based on the Bure reference value chosen by said reference-value setting section 12c, the drive circuit control section 12 calculates the amount of drives of VR lens (un-illustrating) and a drive rate, and a driving direction, drives VR lens mechanical component 14 through VR lens drive circuit 13, and moves VR lens. In addition, VR lens movement magnitude detecting element 15 is a part which detects the movement magnitude of VR lens with an encoder etc.
[0024] It calculates proper light exposure, by the drive circuit control section 22, automatic exposure equipment 20 detects the quantity of light of a photographic subject, through the shutter drive circuit 25, drives the shutter mechanical component 26, moves a shutter (un-illustrating) while it drives the diaphragm wing mechanical component 24 and moves a diaphragm wing (un-illustrating) through the diaphragm wing drive circuit 23, and it exposes it on a non-illustrated film by the acoustic emission sensor 21.
[0025] By the AF sensor 31, the automatic-focusing adjustment 30 detects the distance to a photographic subject, or phase contrast, drives the focal lens mechanical component 34 through the focal lens drive circuit 33, and focuses by calculating the amount of focus drives and moving a focal lens (un-illustrating) by the drive circuit control section 32.
[0026] Drawing 2 is a flow chart which shows the 1st operation gestalt of the Bure compensator by this invention. This operation gestalt shows the case where a camera is equipped with the Bure compensator by this invention. Although the following actuation is performed by one CPU3, each function of the drive circuit control sections 12, 22, and 32 shown in drawing 1 is explained as what is performed by assigning. If a main switch Msw is turned on (S101:Yes) and the half-push switch S1 is turned on (S102:Yes), a power source is supplied to each sensors 11, 21, and 31 of VR, AE, and AF, detection is started, and it calculates based on these outputs, and the drive circuit control section 22 determines a suitable shutter speed, a diaphragm value, etc., and the drive circuit control section 32 directs AF drive (S103).
[0027] Here, the drive circuit control section 12 asks CPU3 the residue of the power source 4 of the body 1 of a camera, or the throughput of CPU3. Reference-value operation part 12a starts the operation of the Bure reference value based on the output detected by (S104:Yes) and the VR sensor 11, when the residue of a power source 4 is more than fixed, or when allowances are in the throughput of CPU3 (S105). The operation of the Bure reference value is performed by equalizing all the outputs after the VR sensor 11 starts detection until it starts exposure. In order that this operation may raise the precision of the Bure reference value, the half-push switch S1 is continuously performed between half-push conditions.
[0028] Moreover, when the residue of a power source 4 is below fixed, or when there are no allowances in the throughput of CPU3, the Bure reference value memorized by (S104:No) reference-value storage section 12b is read (S115).
[0029] That is, the Bure reference value is chosen according to the residue of a power source 4, or the throughput of CPU3, and is set as reference-value setting section 12c.
[0030] On the other hand, the drive circuit control section 12 centers VR lens toward a predetermined initial valve position so that the lead in the optical axis of the whole taking lens which is an initial valve position for the optical axis of (S102) and VR lens to start VR drive with the half-push switch S1 may be taken (S106).
[0031] When the half-push switch S1 continues (S107:Yes) being pushed as it is and all the push switches S2 are pushed here (S108:Yes), further the drive circuit control section 12 Based on the output detected by the VR sensor 11, and the Bure reference value set as reference-value setting section 12c, the amount of drives of VR lens and a drive rate, and a driving direction are calculated, and the drive of VR lens mechanical component 14 is started through VR lens drive circuit 13 (S109). in addition — the case where the half-push of the half-push switch S1 is canceled — (S107:NO), again, it stands by until half-push (S102:No).
[0032] Subsequently, the drive circuit control section 22 starts the exposure to a film (S110), and ends exposure by predetermined time amount (S111). And if the drive circuit control section 12 stops VR drive (S112), CPU3 will start actuation of the preparation with which the next photography of feed of a film, shutter charge, a mirror down, etc. was equipped (S113). Then, the current supply to each sensors 11, 21, and 31 is suspended

(S114), and photography is ended. In addition, although it explained that it was chosen according to the residue of a power source 4, or the throughput of CPU3, you may make it choose the Bure reference value in (S104) according to the residue of a power source 4, and the throughput of CPU3, for example.

[0033] (2nd operation gestalt) Drawing 3 is a flow chart which shows the 2nd operation gestalt of the Bure compensator by this invention. Each operation gestalt shown below shows the case where a camera is equipped with the Bure compensator by this invention. In addition, each operation gestalt explained below omits the explanation with the 1st same operation gestalt and hard configuration which were mentioned above which sake [explanation], illustrates and overlaps.

[0034] A photography person chooses whether the Bure reference value is calculated from the output of the VR sensor 11, or it should memorize to reference-value storage section 12b, and the 2nd operation gestalt enables it to input it into reference-value setting section 12c with hand control [invention of claim 4].

[0035] That is, after supplying a power source to each sensors 11, 21, and 31 of VR, AE, and AF and starting detection (S103), the drive circuit control section 12 asks the established state of reference-value setting section 12c. Furthermore, the drive circuit control section 12 reads the Bure reference value which calculated the Bure reference value from the output of the VR sensor 11 by reference-value operation part 12a (S205), or was memorized by reference-value storage section 12b based on the established state of reference-value setting section 12c (S215). Then, the drive circuit control section 12 calculates the amount of Bure amendments based on the Bure reference value set as reference-value setting section 12c.

[0036] In order to turn off a high-speed shutter, when Bure amendment with a high precision does not need to be performed according to the 2nd operation gestalt, the Bure reference value can be set up based on a photography person's intention to suppress consumption of power, and the burden to CPU.

[0037] (3rd operation gestalt) Drawing 4 is a flow chart which shows the 3rd operation gestalt of the Bure compensator by this invention. When the Bure reference value which started and calculated the operation of the Bure reference value based on the output of the VR sensor 11 approaches the Bure reference value memorized by the reference-value storage section 15, the 3rd operation gestalt ends said operation and makes this value that approached the Bure reference value [invention of claim 5].

[0038] That is, after supplying a power source to each sensors 11, 21, and 31 of VR, AE, and AF and starting detection (S103), by reference-value operation part 12a, the drive circuit control section 12 starts the operation of the Bure reference value based on the output of the VR sensor 11 (S305), and, subsequently to reference-value storage section 12b, reads the memorized Bure reference value (S315).

[0039] The drive circuit control section 12 ends the operation of the Bure reference value at (S317:Yes) and its time, when the difference becomes predetermined within the limits about the calculated Bure reference value as compared with the memorized Bure reference value (S316) (S318), and it determines the Bure reference value (S319).

[0040] In addition, by outputting the duration until a difference with the Bure reference value remembered to be the calculated Bure reference value becomes predetermined within the limits to the storage section, in the Bure compensator of the 4th operation gestalt which mentions this later, it can be used in order to determine the predetermined time of the Bure reference-value operation (S417).

[0041] Moreover, when the difference of the Bure reference value which the conditions at the time of photography calculated unlike the conditions at the time of storage etc., and the memorized Bure reference value does not become predetermined within the limits for example, it is decided by (S317:No) and all the push switches S2 that they will be (S320:Yes) and the calculated Bure reference value in the time (S329). In addition, when all push [all the push switches S2], the operation of the Bure reference value is continued until the aforementioned difference becomes predetermined within the limits (S320:No).

[0042] According to the 3rd operation gestalt, since it is ended when a difference with the memorized Bure reference value becomes predetermined within the limits, the operation of the Bure reference value can hold down future power consumption, and also it can turn the throughput of CPU to other processings. Moreover, when the conditions at the time of photography differ from the conditions at the time of storage, since the difference with the Bure reference value remembered to be the calculated Bure reference value does not become predetermined within the limits but it is decided that it will be the Bure reference value which met the conditions at the time of photography in this case, Bure amendment with a high precision can be carried out.

[0043] Furthermore, after the decision of the Bure reference value does not produce an error in the Bure reference value by this, unless it is exposure under panning, even if it performs sudden panning, when the output of VR sensor is fully stable.

[0044] (4th operation gestalt) Drawing 5 is a flow chart which shows the 4th operation gestalt of the Bure compensator by this invention. The 4th operation gestalt starts the operation of the Bure reference value based on the output of the VR sensor 11, ends an operation by progress of predetermined time, and determines the Bure reference value [invention of claim 6].

[0045] That is, after supplying a power source to each sensors 11, 21, and 31 of VR, AE, and AF and starting detection (S103), the drive circuit control section 12 starts the operation of the Bure reference value based on the output of the VR sensor 11 (S405). Then, (S417:Yes) and an operation are ended by progress of predetermined time (S419), and the Bure reference value is determined (S419).

[0046] Moreover, when the all push [(S417:No) and all the push switches S2] before going through predetermined time, an operation is ended at (S420:Yes) and its time (S428), and the Bure reference value is determined (S429). in addition — the case, all push [all the push switches S2], — (S420:No) — the time amount of a reference-value operation is measured again (S417).

[0047] According to the 4th operation gestalt, since the predetermined passage of time is completed, the operation of the Bure reference value can hold down future power consumption, and also it can turn the throughput of CPU to other processings.

[0048] Furthermore, after the decision of the Bure reference value does not produce an error in the Bure reference value by this, unless it is exposure under panning, even if it performs sudden panning, when the output of VR sensor is fully stable.

[0049]

[Effect of the Invention] Maintaining a certain amount of precision, since either the calculated Bure reference value or the memorized Bure reference value is chosen according to the residue of a power source, and the throughput of CPU according to this invention as explained in detail above, the Bure reference value can be set up in a short time, and the Bure compensator which suppressed consumption of power and the burden to CPU can be offered.

[0050] Moreover, in order to suppress consumption of power, and the burden to CPU, corresponding to a photography situation when this is used for photography equipments, such as a camera, for example since either the calculated Bure reference value or the memorized Bure reference value can be chosen by manual input, the Bure reference value can be chosen based on a photography person's intention, and the user-friendliness of photography equipments, such as a camera, can be received.

[0051] Furthermore, since said operation is ended at the time and the Bure reference value is determined when the difference of the calculated Bure reference value and the memorized Bure reference value becomes predetermined within the limits, the Bure compensator which suppressed consumption of power and the burden to CPU can be offered. Moreover, since the operation of the Bure reference value is ended and the Bure reference value is determined by the predetermined passage of time, the Bure compensator which suppressed consumption of power and the burden to CPU can be offered.

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram having shown the 1st example at the time of equipping a camera with the Bure compensator by this invention.
[Drawing 2] It is the flow chart showing actuation of the Bure compensator concerning the 1st example.
[Drawing 3] It is the flow chart showing actuation of the Bure compensator concerning the 2nd example.
[Drawing 4] It is the flow chart showing actuation of the Bure compensator concerning the 3rd example.
[Drawing 5] It is the flow chart showing actuation of the Bure compensator concerning the 4th example.
[Description of Notations]
1 Camera 2 Lens
3 CPU 4 Power Source
10 Bure Compensator 11 VR Sensor
12 Drive Circuit Control Section 12a Reference-Value Operation Part
12b Reference-value storage section 12c Reference-value setting section
13 VR Lens Drive Circuit 14 VR Lens Mechanical Component
15 VR Lens Movement Magnitude Detecting Element 16 Manual Selection Section
20 Automatic Exposure Equipment 21 Acoustic Emission Sensor
22 Drive Circuit Control Section 23 Diaphragm Wing Drive Circuit
24 Drawing Wing Mechanical Component 25 Shutter Drive Circuit
26 Shutter Mechanical Component 30 Automatic-Focusing Adjustment
31 AF Sensor 32 Drive Circuit Control Section
33 Focal Lens Drive Circuit 34 Focal Lens Mechanical Component

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[Translation done.]